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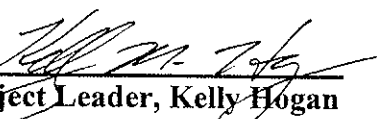
DES LACS NATIONAL WILDLIFE REFUGE

WATER MANAGEMENT PLAN

2009

Prepared by: 
Refuge Manager, Dave Bolin


Date: 2-3-09


Concurrence: 
Project Leader, Kelly Hogan

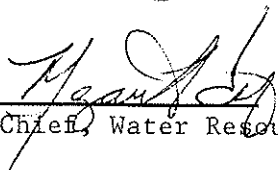
Date: 3-5-09

Regional Approval: 
Refuge Supervisor

Date: 3-5-09

Regional Approval: 
Regional Chief of Refuges

Date: 

Regional Approval: 
Chief, Water Resources Division

Date: 3/11/09

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2008 WATER MANAGEMENT

Water management at Des Lacs NWR in 2008 would best be characterized as "drier than average".

Total winter precipitation for the October 2007-April 2008 below the average fall-winter precipitation except for February which brought above normal precipitation in the form of snow (see TABLE 1). The below average winter precipitation, coupled with dry topsoil conditions and a poor fall frost seal, equated to very little spring run-off and unit levels below Spring objectives.

May 2008 started dry but frequent rains changed the outlook and by the end of the month we had received 3.10" of precipitation on 8 days. The biggest rain event was 1.20" of rainfall received on May 29. Rain continued unabated in June, and by the end of the month we had received 4.15" of precipitation on 14 days (see TABLE 1). Units 1, 2, 5, 6, 7, and 8 did not meet unit objective levels after spring run-off set in the 2008 Water Management Plan. Only units 3 and 4 met objective levels.

We received rain on six days throughout the month of July totaling 1.60" or 1" below normal (see TABLE 1).

August and September precipitation was 2" above normal. October precipitation was above normal although we only received precipitation on three days (see TABLE 1). November was drier than average and all units froze over on November 22nd, except for one small hole on Unit 4. In December, we received near record amounts of snow (24.0") totaling 2.35" of precipitation (see TABLE 1).

As you can see from the above narrative, water management objectives in 2008 were not accomplished because of dry conditions. The dry conditions allowed the opportunity to dry up some of the pools below normal levels, which should increase desirable vegetative conditions when the units fill up again.

In August and September, an excavator was used to cleanout the Unit 7 to 8 bypass channel (see Figure 1 and 2), and the unit 4, 4A, 5, 6, and 7 water control structures. New stop logs were constructed for structures 4 and 4A. During October and November 2008, staff burned, mowed, and disced cattails in Units 5 and 6 for cattail control.



Figure 11. Unit 8 bypass ditch with bulrush blocking flow just south of Unit 7 water control structure. This was later treated with glyphosate and will be cleaned out in 2008. 7/07 DJS.



Figure 2. Unit 2 Water Control Structure, water flowing north during spring 1997 runoff. View from NE to SW. April 1997 DJS. Similar conditions in 2009 are expected.



Figure 3. Unit 8 bypass channel cleanout in September, 2008. Unit 8 in background.
Photo taken 10-7-2008. DEB

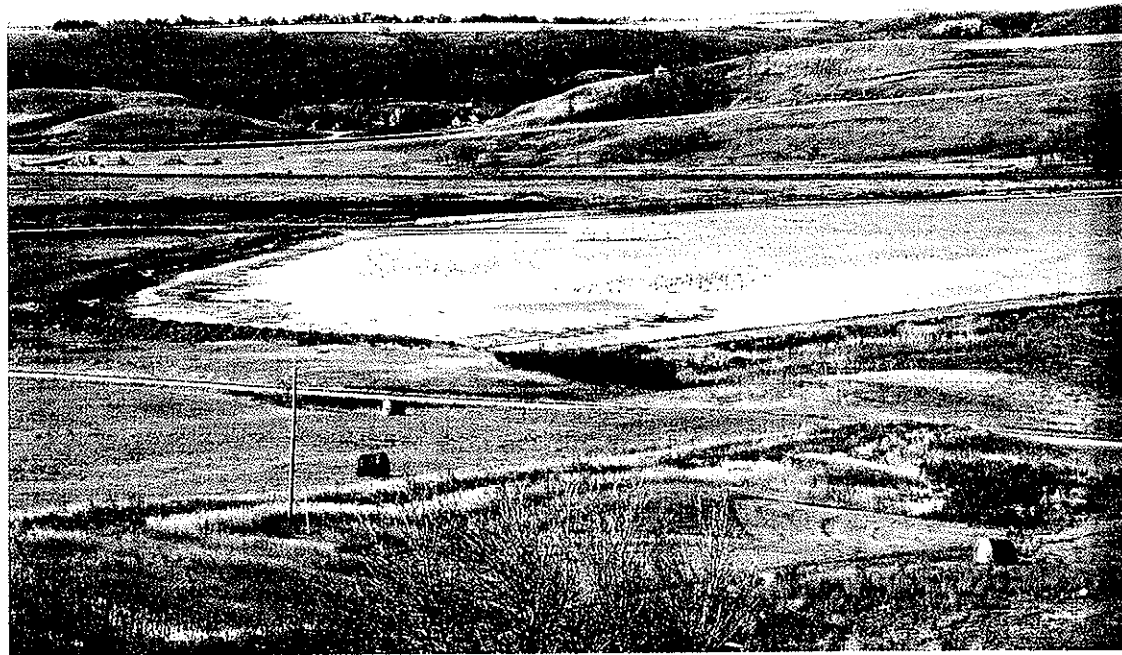


Figure 4. Unit 7 dike and unit 8 with water and waterfowl utilization. Note bypass channel cleanout.
Photo taken 10-7-2008. DEB

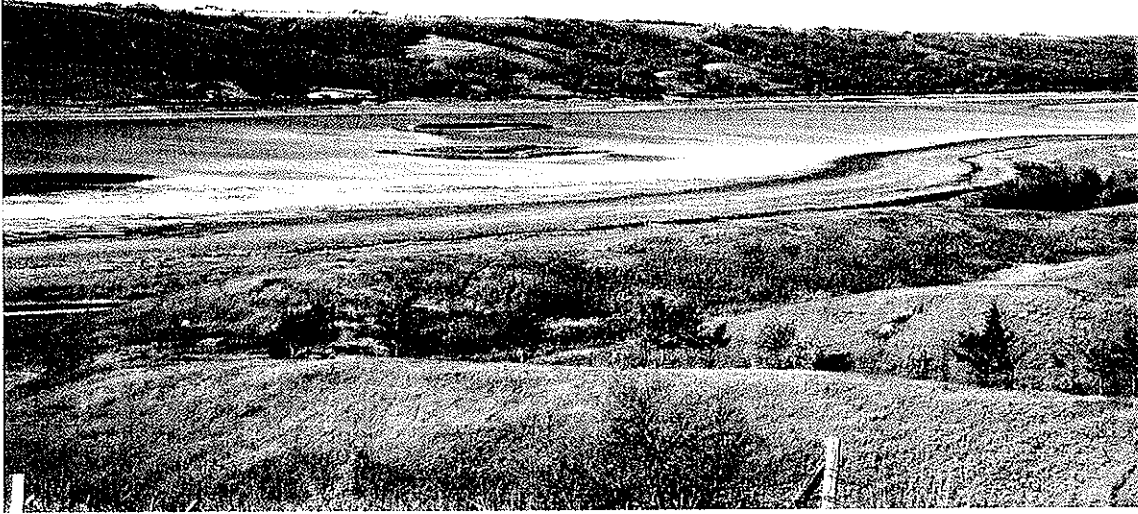


Figure 5. View of most northern islands on Unit 7. 10-7-2008. DEB



Figure 6. Whooping cranes on Unit 7. Cranes utilized the pool for over one week. 10-17-2008. DEB

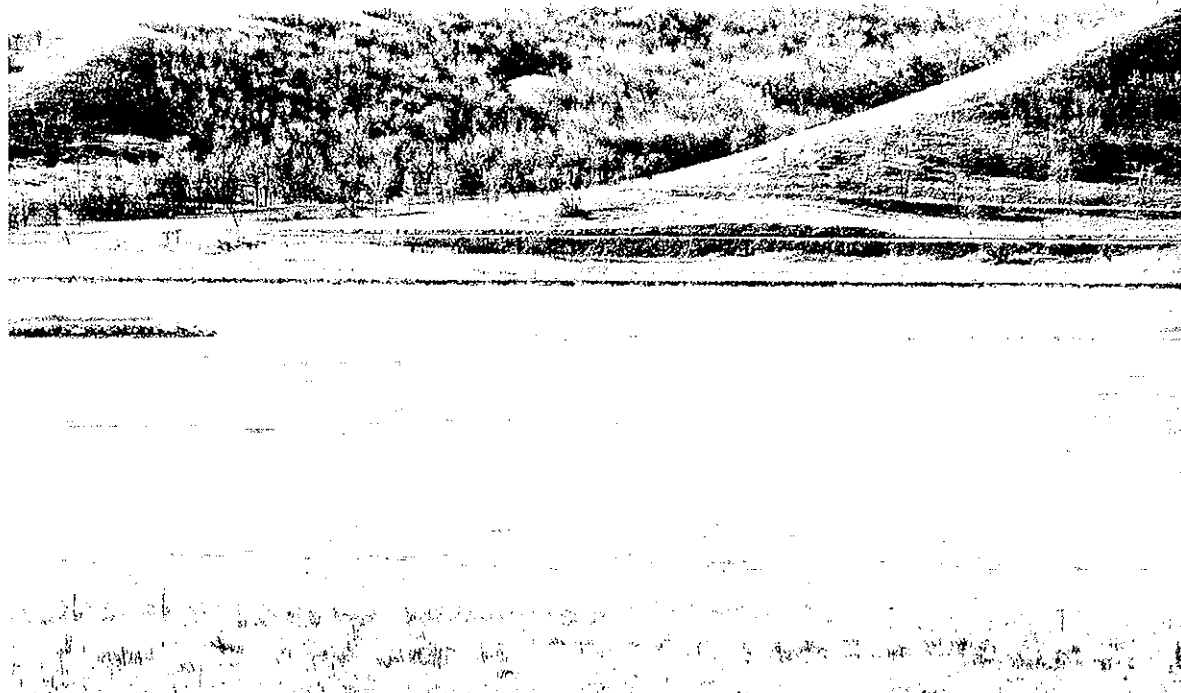


Figure 7. Whooping cranes lower end of Unit 7. 10-17-2008. DEB

TABLE 1. Climatic Conditions on Des Lacs NWR October 2007-December 2008 measured at Kenmare, ND

MONTH	TEMPERATURES (°F)		PRECIPITATION (inches)		
	HIGH	LOW	SNOW	MOISTURE	AVERAGE MOISTURE
OCTOBER 2007	76	24		.85	0.94
NOVEMBER 2007	60	-11	2	.02	0.58
DECEMBER 2007	38	-15	3.6	.31	0.52
JANUARY 2008	43	-29	2.25	.24	0.83
FEBRUARY	38	-24	10.25	1.41	0.63
MARCH	54	-17	3.40	.49	0.9
APRIL	81	9	.10	.11	1.26
MAY	78	25		3.10	2.07
JUNE	86	40		4.15	2.66
JULY	93	46		1.60	2.67
AUGUST	98	42		3.14	1.8
SEPTEMBER	94	34		3.65	1.92
OCTOBER	75	17	4.70	1.30	1.19
NOVEMBER	61	-1		.30	0.69
DECEMBER 2008	40	-28	24	2.35	0.53
TOTAL 2008			44.7	21.84	17.15

The NOAA Climate Reference Network weather station was operational all of 2008. The station is located 20 miles north of Kenmare on the west side of the lake in Unit HB-4.

WATER MANAGEMENT PLAN FOR 2009

Prospects for significant runoff in Spring 2009 are high as of late February due to heavy snowpack, and a good frost seal. Total snowfall from October to February 24th was 68.22" with 8.12" of precipitation. It is expected all Units will fill to capacity.

The focus of water management this year will change from objectives in the Long Range Management Plan, approved in 1990. Objectives this year will be to alleviate flooding downstream and serve as temporary flood storage during the peak spring run-off period, and then switch gears and attempt to dewater from Unit 4 south to facilitate Unit 4 and 6 water control structure replacement.

We have continued an active dialogue with the Ward County Water Resources Board in developing a plan to put in a Bypass Channel and associated water control structures that would bypass water around Units 4, 5 and 6 and allow lower water levels to be maintained in Units 1, 2 and 4 as desired under the Long Range Water Management Plan. The Board so far has been willing to commit money to the project if we could potentially store additional water in the spring to alleviate downstream flooding where the Des Lacs River dumps into the Souris River near Burlington. Project planning will include compatibility, environmental assessment, public involvement and 404 permitting. The Board will have to come up with the funding to make the project happen if it gets through all the planning and regulatory processes. The Unit 4 and 6 water control structure invert will be set at elevation identified in the bypass channel plans.

Unit 1

The primary objective level after spring runoff will be 1782.0 or lower as stated in the long range management plan. The Unit 1 water level froze at an estimated 1779.50. The water level froze below the level of the structure, and a gauge reading was not taken. In addition, the lower segment of the gauge has broken off and needs to be replaced. The Unit 1 water control structure will be set to allow excess water to be released into Unit 2 and farther south. The water levels in Unit 1 and Unit 2 will be managed at the same levels and be controlled by the Unit 2 water control structure at an elevation of 1786.4. It is expected the unit will reach spillway elevation in Spring 2009, if run off meets current expectations.

Unit 2

The primary objective level after spring run off will be 1782.5. If this objective is met and exceeded by spring runoff, excess water will be released into Units 4 and 5 and farther downstream in an attempt to meet the objective levels of those pools, and to keep Unit 2 low enough to allow emergents that have become established to continue to grow. Unit 2 water level froze at 1780.0 in November 2008, 2.0' lower than the 1782.0 average for December from 1998-2006 freeze-up levels. The water and ground levels in Unit 4 continue to restrict flow downstream out of Unit 2. The high water level in Unit 4 will prevent releases out of Unit 2 to the south and the Unit 2 level will ultimately be determined by the amount of runoff and evaporation rates.

It is expected Unit 4 will rise close to spillway levels in the spring of 2009. In this case,

the Unit 2 structure will be opened to allow excess to move North from Unit 4 (see figure 2), and serve as storage until spring-runoff subsides. Unit 2 levels will rise to spillway crest levels if Units 1, 2, 3, and 4 equalize.

Unit 3

The objective level after spring runoff will be the spillway level of 1787.0. Current level at November 2008 freeze-up was 1786.6. Except for temporary removal of stop logs to release excess water during peak run-off periods, the structure will not be changed. The Unit 3 water control structure will remain closed all year. This unit is expected to easily fill to spillway levels in the spring. If Unit 4 reaches the spillway crest elevation, Unit 2, 3, and 4 will be allowed to equalize at approximately 1788.54.

Unit 4

The water level at freeze-up in November 2008 was 1781.68, below the normal objective level of 1783.5. Spring water levels are expected to rise to Unit 4 spillway crest elevation (1788.54). If this is the case, the structure boards will be removed to allow excess water to move north (See figure 2) into Units 1 and 2 and for storage to prevent potential flooding downstream. After spring runoff subsides, the unit will be in draw-down in preparation for replacement of the water control structure in summer or early fall. This will most likely not be accomplished because of the constraints in the system, and construction of coffer dams will be necessary. Based on a survey completed for the Ward County Water Resources Board in 2003, the high point that controls the lowest level that Unit 4 can be drawn down is about 500' south of the structure and is at elevation 1783.75', 3 feet higher than the outlet invert elevation.

Unit 4A

The objective level after spring runoff will be normal at 1788.4. Generally the unit is filled to the spillway level which is 1788.4. The unit was dry at fall freezup in November 2008. All boards are out of the water control structure and will remain out to pass runoff flows, and then boarded up to capture enough flow to fill the unit to spillway elevation. The structure was cleaned out in fall 2008 and will pass adequate water. Peak water level are expected to reach 1789.0 during spring runoff. Water levels will be kept at 1787.0 if possible into the fall.

Unit 4B

No water was pumped in 2008. Low water levels in the spring did not produce any habitat in the unit. No pumping is planned in 2009, and the unit is expected to partially fill up with above average spring runoff.

Unit 5

The long range plan objective level after spring runoff is 1783.5. If above average spring

runoff is achieved, the Unit will be held at spillway crest level of 1784.6 until spring runoff subsides. After spring runoff, Unit 5 will be drawn down to facilitate complete drawdown in Unit 4. At November 2008 freeze-up, the unit was completely dry.

Unit 6

The objective level after spring runoff is 1783.4, which is the emergency spillway full pool level. The water level at freeze-up in November 2008 was below the measureable level on the gauge, and was mostly dry. This unit is expected to be above the normal long range plan objective level of 1783.0 in spring 2009 and will be held at the spillway crest level of 1783.36 until spring runoff subsides. The unit will then be de-watered as much as possible to facilitate construction of a replacement water control structure in late summer. This may cause increased germination of cattails. Cattails have been kept at acceptable levels with high water levels, and careful consideration of not lowering water levels too early when temperatures are still high. Additional mowing or disking of cattails may occur in the fall if extensive germination is noted in order to keep the cattails from dominating the shallow water unit.

Unit 7

The long range plan calls for a target level of 1780.0 after spring runoff. The unit was below the fall target level of 1780.0, as the last measureable reading was 1779.0 in early July. The Unit lowered throughout the fall due to evaporation. Fall freeze-up level was well below the water gauge (see photo). Above average Spring runoff is expected to fill the Unit to a spillway crest level of 1778.50. The bypass ditch is expected to run. The ditch was cleaned out in summer/fall of 2009. After spring runoff subsides, the Unit will need to be dewatered to facilitate dewatering of Unit 6 for replacement of the water control structure. No botulism has occurred in the unit in 2006-2008, with low water levels and high temperatures.

Unit 8

The long range plan objective level after spring runoff is 1783.9 or spillway crest level. In 2009, this objective will not be achieved in order to facilitate dewatering of Units 4,5,6, and 7 for late summer/fall 2009 replacement of water control structures #4 and #6. Spring runoff is expected to be above average and fill the unit to spillway level. The cleanout of the bypass channel in 2008 should allow Unit 8 to remain at the objective level of 1782.0 in September. Fall 2008 freeze-up level was 1779.44, 2 feet lower than the level the previous 2 years.

DES LACS NWR IMPOUNDMENT DATA

UNIT 1

PROGRAM YEAR 2009

WATER SURFACE ELEVATION FOR 2008	PLANNED WATER SURFACE ELEVATION FOR 2009
PLANNED: HIGH: <u>1786.4</u> LOW: <u>1780.0</u>	
JANUARY 31 FROZEN AT 1780.70	
FEBRUARY 29 FROZEN AT 1780.70	
MARCH no report	
APRIL 12 1780.40	1786.4
MAY 28 no report	
JUNE 16 1780.32	1783.5
JULY 3 1780.20	
AUGUST no report	
SEPTEMBER no report	
OCTOBER 14 no gauge	1780.0
NOVEMBER 24 no gauge	
DECEMBER 31 no gauge (estimate 1779.5)	
HIGH (AFTER SPRING RUNOFF): <u>1780.40</u> HIGH FOR YEAR: <u>1780.70</u>	
LOW: <u>1780.20</u>	
MAXIMUM ELEVATION PERMISSIBLE (CREST OF SPILLWAY): <u>1785.6*</u>	
BOTTOM OF OUTLET: <u>1779.5*</u>	
Acre-feet stored as of December 31 <u>11580 AF</u>	
Maximum Acre-feet stored at spillway elevation 1785.6 <u>27163 AF</u>	
*1999 survey results-changed from previous records	

DES LACS NWR IMPOUNDMENT DATA

UNIT 2

PROGRAM YEAR 2009

WATER SURFACE ELEVATION FOR 2008	PLANNED WATER SURFACE ELEVATION FOR 2009
PLANNED: HIGH: <u>1786.2</u> LOW: <u>1780.0</u>	
JANUARY 31 FROZEN AT 1780.60	
FEBRUARY 29 FROZEN AT 1780.60	
MARCH no report	
APRIL 27 1780.06	1786.2
MAY 28 1780.04	
JUNE 16 1780.27	1783.5
JULY 3 1780.10	
AUGUST no report	
SEPTEMBER no report	
OCTOBER 14 1779.80	1780.0
NOVEMBER 24 FROZEN AT 1780.02	
DECEMBER 31 FROZEN AT 1780.02	
HIGH (AFTER SPRING RUNOFF): <u>1780.06</u> HIGH FOR YEAR: <u>1780.27</u> LOW: <u>1779.80</u>	
MAXIMUM ELEVATION PERMISSIBLE (CREST OF SPILLWAY): <u>1789.4*</u> BOTTOM OF OUTLET: <u>1778.33*</u>	
Acre-feet stored as of December 31 <u>6100 AF</u> Maximum Acre-feet stored at spillway elevation 1786.2 <u>16614 AF</u> *2000 New water control structure-change from previous records	

DES LACS NWR IMPOUNDMENT DATA

UNIT 3

PROGRAM YEAR 2009

WATER SURFACE ELEVATION FOR 2008	PLANNED WATER SURFACE ELEVATION FOR 2009
PLANNED: HIGH: <u>1787.0</u> LOW: <u>1784.0</u>	
JANUARY 31 Dry	
FEBRUARY 29 Dry	
MARCH 19 1785.88	
APRIL 27 1786.96 Spilling	1787.0
MAY 28 1787.0 Spilling	1787.0
JUNE 16 1787.10 Spilling	
JULY 3 1786.40	
AUGUST no report	
SEPTEMBER no report	
OCTOBER 14 1785.75	
NOVEMBER 24 Frozen at 1786.6	
DECEMBER 31 Frozen at 1786.6	
HIGH (AFTER SPRING RUNOFF): <u>1787.7</u> HIGH FOR YEAR: <u>1787.7</u>	
LOW: <u>1784.0 Dry</u>	
MAXIMUM ELEVATION PERMISSIBLE (CREST OF SPILLWAY): <u>1787.0</u>	
BOTTOM OF OUTLET: <u>1782.0*</u>	
Acre-feet stored as of December 31 <u>49 AF</u>	
Maximum Acre-feet stored at spillway elevation 1786.96* <u>99 AF</u>	
*1999 survey results-changed from previous records	
? Estimate-Area capacity table doesn't go below 1788.0'	

DES LACS NWR IMPOUNDMENT DATA

UNIT 4

PROGRAM YEAR 2009

WATER SURFACE ELEVATION FOR 2008	PLANNED WATER SURFACE ELEVATION FOR 2009
PLANNED: HIGH: <u>1788.54</u> LOW: <u>1780.5</u>	
JANUARY 31 FROZEN AT 1782.80	
FEBRUARY 29 FROZEN AT 1782.80	
MARCH no report	
APRIL 27 1782.60	1788.54
MAY 28 1782.40	
JUNE 16 1783.90	1783.0
JULY 3 1782.72	
AUGUST no report	
SEPTEMBER no report	1782.0
OCTOBER 14 1781.84	
NOVEMBER 24 FROZEN AT 1781.68	
DECEMBER 31 FROZEN AT 1781.68	
HIGH (AFTER SPRING RUNOFF): <u>1782.6</u> HIGH FOR YEAR: <u>1783.90</u> LOW: <u>1781.68</u>	
MAXIMUM ELEVATION PERMISSIBLE (CREST OF SPILLWAY): <u>1788.5*</u> BOTTOM OF OUTLET: <u>1780.4*</u>	
Acre-feet stored as of December 31 <u>451 AF</u> Maximum Acre-feet stored at spillway elevation 1788.5 <u>5649 AF</u> *1999 survey results-changed from previous records	

DES LACS NWR IMPOUNDMENT DATA

UNIT 4A

PROGRAM YEAR 2009

WATER SURFACE ELEVATION FOR 2008	PLANNED WATER SURFACE ELEVATION FOR 2009
PLANNED: HIGH: <u>1788.4</u> LOW: <u>1785.0</u>	
JANUARY 31 1786.20 frozen	
FEBRUARY 29 1786.20 frozen	
MARCH 19 1785.66	
APRIL 27 1785.10	1788.4
MAY 28 1784.90	
JUNE 16 1785.20	
JULY 3 1784.94	
AUGUST no report	Dry
SEPTEMBER no report	
OCTOBER 14 Dry	
NOVEMBER 24 Dry	
DECEMBER 31 Dry	
HIGH (AFTER SPRING RUNOFF): <u>1785.10</u> HIGH FOR YEAR <u>1786.20</u> LOW: <u>Dry</u>	
MAXIMUM ELEVATION PERMISSIBLE (CREST OF SPILLWAY): <u>1788.4*</u> BOTTOM OF OUTLET: <u>1786.6*</u>	
Acre-feet stored as of December 31 <u>00?</u> AF Maximum Acre-feet stored at spillway elevation 1788.4* <u>47</u> AF *1999 survey results-changed from previous records ? Estimate-Area capacity table doesn't go below 1788.0' **Estimate-gauge does not go that low, removed during work on dike.	

DES LACS NWR IMPOUNDMENT DATA

UNIT 5

PROGRAM YEAR 2009

WATER SURFACE ELEVATION FOR 2008	PLANNED WATER SURFACE ELEVATION FOR 2008
PLANNED:	HIGH: <u>1784.6</u> LOW: <u>Dry</u>
JANUARY 31 1782.90 Frozen	
FEBRUARY 29 1782.90 Frozen	
MARCH no report	
APRIL 27 1782.46	1784.6
MAY 28 1782.44	
JUNE 16 1782.94	
JULY 3 1782.54	
AUGUST no report	Dry
SEPTEMBER no report	
OCTOBER 14 1780.51	
NOVEMBER 24 Dry	
DECEMBER 31 Dry	
HIGH (AFTER SPRING RUNOFF): <u>1782.46</u> HIGH FOR YEAR <u>1782.94</u>	
LOW: <u>Dry</u>	
MAXIMUM ELEVATION PERMISSIBLE (CREST OF SPILLWAY): <u>1784.6*</u>	
BOTTOM OF OUTLET: <u>1779.2*</u>	
Acre-feet stored as of December 31: <u>0 AF</u>	
Maximum Acre-feet stored at spillway elevation 1784.6* <u>90 AF</u>	
*1999 survey results-changed from previous records	

DES LACS NWR IMPOUNDMENT DATA

UNIT 6

PROGRAM YEAR 2009

WATER SURFACE ELEVATION FOR 2008	PLANNED WATER SURFACE ELEVATION FOR 2009
PLANNED: HIGH: <u>1783.4</u> LOW: <u>Dry</u>	
JANUARY 31 FROZEN AT 1782.80	
FEBRUARY 29 FROZEN AT 1782.80	
MARCH 23 no report	
APRIL 27 1782.40	1783.4
MAY 28 1782.20	
JUNE 26 1782.56	
JULY 3 1782.30	
AUGUST no report	Dry
SEPTEMBER no report	
OCTOBER 14 Dry	
NOVEMBER 24 Dry	
DECEMBER 31 Dry	
HIGH (AFTER SPRING RUNOFF): <u>1782.40</u> High for the year: <u>1782.56</u> LOW: <u>Dry</u>	
MAXIMUM ELEVATION PERMISSIBLE (CREST OF SPILLWAY): <u>1783.4*</u> BOTTOM OF OUTLET: <u>1777.7*</u>	
Acre-feet stored as of December 31 <u>0 AF</u> Maximum Acre-feet stored at spillway elevation 1783.4* <u>289 AF</u> *1999 survey results-changed from previous records	

DES LACS NWR IMPOUNDMENT DATA

UNIT 7

PROGRAM YEAR 2009

WATER SURFACE ELEVATION FOR 2008	PLANNED WATER SURFACE ELEVATION FOR 2009
PLANNED: HIGH: <u>1783.9</u> LOW: <u>Dry</u>	
JANUARY 31 FROZEN AT 1778.90	
FEBRUARY 28 FROZEN AT 1778.90	
MARCH 13 no report	
APRIL 27 1778.90	1783.9
MAY 28 1779.04	
JUNE 16 1779.0	
JULY 3 1779.0	1779.0
AUGUST no report	Dry
SEPTEMBER no report	
OCTOBER 14 Dry	
NOVEMBER 24 Dry	
DECEMBER 31 Dry	
HIGH (AFTER SPRING RUNOFF): <u>1778.90</u> HIGH FOR YEAR <u>1779.04</u> LOW: <u>Dry</u>	
MAXIMUM ELEVATION PERMISSIBLE (CREST OF SPILLWAY): <u>1783.9*</u> BOTTOM OF OUTLET: <u>1778.5</u>	
Acre-feet stored as of December 31 <u>0 AF</u> Maximum Acre-feet stored at spillway elevation 1783.9* <u>2556 AF</u> *1999 survey results-changed from previous records	

DES LACS NWR IMPOUNDMENT DATA

UNIT 8

PROGRAM YEAR 2009

WATER SURFACE ELEVATION FOR 2008	PLANNED WATER SURFACE ELEVATION FOR 2009
PLANNED: HIGH: <u>1783.9</u> LOW: <u>1782.0</u>	
JANUARY 31 FROZEN AT 1781.40	
FEBRUARY 28 FROZEN AT 1781.40	
MARCH 21 no report	
APRIL 27 1779.90	1783.9
MAY 28 1780.30	
JUNE 16 1780.30	
JULY 3 1780.40	
AUGUST no report	
SEPTEMBER no report	1782.0
OCTOBER 14 1779.50	
NOVEMBER 24 FROZEN AT 1779.44	
DECEMBER 31 FROZEN AT 1779.44	
HIGH (AFTER SPRING RUNOFF): <u>1779.90</u> HIGH FOR YEAR <u>1780.40</u> LOW: <u>1779.44</u>	
MAXIMUM ELEVATION PERMISSIBLE (CREST OF SPILLWAY): <u>1783.9*</u> BOTTOM OF OUTLET: <u>1780.0*</u>	
Acre-feet stored as of December 31 <u>1 AF</u> Maximum Acre-feet stored at spillway elevation 1783.9* <u>127 AF</u> *1999 survey results-changed from previous records	

DES LACS NATIONAL WILDLIFE REFUGE

February 25, 2009

POTENTIAL WATER STORAGE

Unit	Current Elevation	Spillway Elevation	Max Acre-foot Storage at Spillway Elevation	Expected Surface Acres in 2009	Current Surface Acres	Current Acre-feet Stored	Acre-feet Storage	Peak 2008 Elevation
1	1779.5	1786.0*	28237	2700	2345	11580	16657	1780.4
2	1780.0	1786.2*	16614	1786	1534	6070	10544	1780.3
3	1786.6	1787.0	99	57	49	49	50	1787.1
4	1781.68	1788.5	5649	902	669	451	5198	1783.9
4a	Dry	1788.4	47	38	0	0	47	1786.2
5	Dry	1784.6	90	70	0	0	90	1782.9
6	Dry	1783.4	289	289	0	0	289	1782.6
7	Dry	1783.9	2556	430	0	0	2556	1779.0
8	1779.4	1783.9	127	111	1	1	126	1780.4
Total			53708	6383	4598	18151	35557	

* No spillway, maximum elevation allowed by water permit

** estimate